

## Contamination Threats to Drinking Water – Part II

### NHDES Source Water Protection Program



**STATE OF NEW HAMPSHIRE**  
**Inter-Department Communication**

DATE: 8/08/07

FROM      Pierce Rigrod, Source Water Protection Program      AT (OFFICE) DES  
SUBJECT    Identification of Contamination Threats to Drinking Water – Part 2.  
TO         Source Water Protection Strategy Advisory Committee

**Potential Contamination Sources (PCS)**

As shown in Paul Susca's July 17 memo using data from the Drinking Water Source Assessment Program, potential contamination sources (PCSs) within 1,000 ft of public water supply wells are associated with a greater frequency of contaminant detects in those wells. PCSs include a wide variety of land uses, many of which are tracked by various DES programs, such as underground storage tanks (USTs) and hazardous waste generators (RCRA). Table 1 lists the types of the most numerous PCSs based upon a review of DES Waste Division and Water Division databases maintained by the Hazardous Waste Compliance Bureau, the Oil Remediation Compliance Bureau and Hazardous Waste Remediation Bureau, the Solid Waste Bureau and the Drinking Water and Groundwater Bureau. For a complete list, please see table entitled, *General Categories and Total Count of Groundwater Hazards in N.H.*, the first attachment to this memo.

**Table 1**  
**Most Numerous PCSs by Type**

Potential Contamination Source (PCS)	Number of Sites	Within WHPAs
Underground Storage Tank (UST) facilities	4,033	768
RCRA (hazardous waste) generators <sup>1</sup>	2,863	600
Underground Injection Control (UIC) sites <sup>2</sup>	1,558	529
Above Ground Storage (AST) facilities <sup>3</sup>	954	205
Vehicle Service & Repair (VSR) facilities	420	198

Within the wellhead protection areas (WHPAs) for public water supply wells, there are approximately 600 RCRA hazardous waste generators, (mostly small quantity, generating less than 110 lbs./month), 529 UIC sites, 205 AST facilities, and 198 VSR facilities.

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<sup>1</sup> DES OneStop database (includes all active small and full quantity generator facilities)

<sup>2</sup> UIC sites include deep disposal wells for industrial and municipal waste, injections related to oil and gas production, wells which inject liquids for the in situ extraction of minerals or energy, injection of hazardous and high level radioactive wastes all other injection wells including those used to discharge treated sewage.

<sup>3</sup> DES Above Ground Storage Tank Program (active facilities)

## Known Sources of Contamination (KCS)

KCSs are sites with known releases to the ground of regulated contaminants. For each site, DES project managers add a note to the database if groundwater has been impacted by released contaminants. Impacted generally means the contaminant is above detection levels. Project managers also assign risk factors ranging from 1-8, with risk category 1 indicating public water supply impact (detection) with an immediate human health risk and risk category 2 representing a public or private water supply is potentially at risk as the KCS is within 1,000 ft of a private well or is within a source water protection area. Risk category 1 may also include sites with unsafe vapors and may not involve PWSs. (See Attachment 2 for a summary of ORCB KCS risk categories and Attachment 3 for a summary of KCS project types)

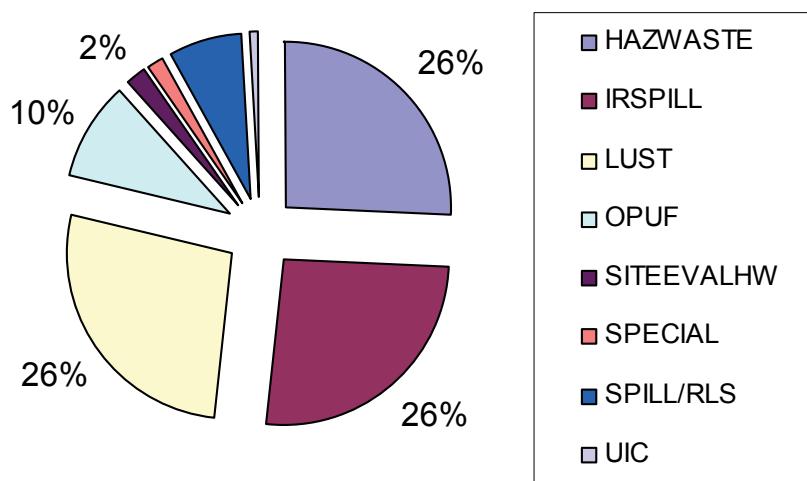
**Table 2**  
**Most Numerous KCSs by Type**

Leaking Underground Storage Tank (LUST) <sup>4</sup>	2,192
Residential or Commercial Heating Oil Tanks (OPUF)	1,651
Underground Injection Control (UIC)	1,558
Non-Petroleum Contamination (HAZARDOUS WASTE)	821
Oil Spill or Release (SPILL/RLS)	544

## KCS Impact on Public Water Supplies

One hundred twelve (112) KCSs are identified within the Contaminated Sites database as having a *detectable impact on a public water supply (PWS)*.<sup>5</sup> The most common KCS project types coded in this group of data as impacting PWSs include: leaking underground storage tank – LUST sites (26%), non-petroleum/ hazardous waste (26%), and IRSPILL (26%). IRSPILLS are minor spills that are cleaned up quickly, while SPILL/RLS is a larger spill with likely impacts upon groundwater or other media<sup>6</sup>.

**Figure 1**  
**KCS Project Types Impacting PWSs**



N = 112; Source ORCB/HWRB Contaminated Sites Database;

<sup>4</sup> Includes 786 active and all other inactive LUST sites according to DES UST Program

<sup>5</sup> Contaminated Sites database information received from ORCB/HWRB in public water supply.xls

<sup>6</sup> A listing of KCS project types is included in Attachment 3.

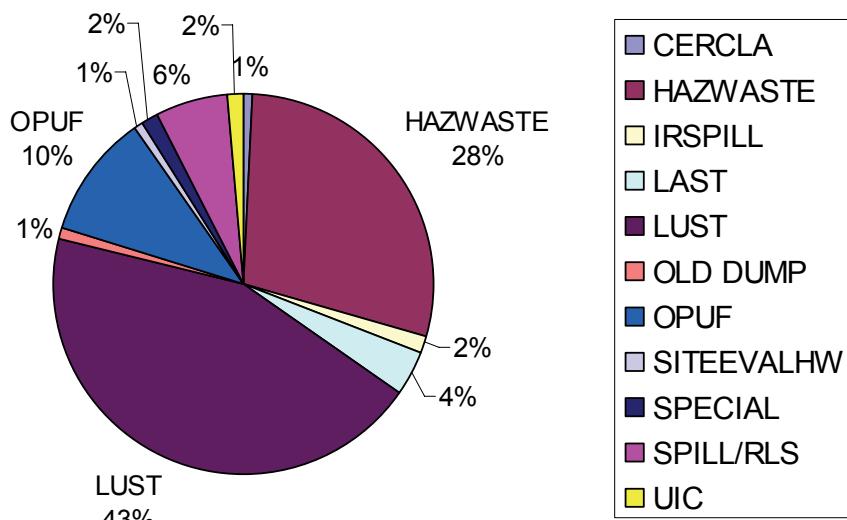
In addition to the 112 KCSs impacting PWSs are 114 impacted water supplies whose sources of contamination are unidentified. The latter group is coded as either ETHER (MTBE) or H2O Sample. ETHER and H2O Sample project types almost always (107 of 114 projects) represent MTBE releases and subsequent detects at public water supplies, however the source of contamination is not clearly identified. With respect to KCSs, typical MTBE releases are associated with 1) tank leaks, 2) auto accident, towing, repair, or 3) auto recycling processing related spillage. Two recent summaries of MTBE studies completed by USGS and Weston Associates may be found in Attachment 4.

Looking at the 112 KCSs with impacts on PWSs *plus* the 114 impacted water supplies with unknown contaminant sources, there have been 13 PWSs with MCL violations (since 1994), four of which were likely due to identified KCSs. These 13 included violations for MTBE (10), tetrachloroethylene (1), trichloroethylene (1) and 1,1 dichloroethylene (1). The total population served by the 13 systems is 1,018. Additional wells have been severely impacted by MtBE where the source of the contamination has not been identified; an estimated 83 PWS wells with MtBE contamination were taken out of service between 1993 and 2003.<sup>7</sup>

### KCS Impacting Other Water Supplies

Contaminated sites have also impacted private drinking water wells or groundwater resources nearby. ORCB/HWRB data indicate that 217 KCSs have impacted other drinking water resources, including private water supplies or releases into nearby water resources (e.g. streams, aquifers). Of these 217 KCSs, records for 133 indicate a release from a specific project type as summarized in Figure 2. The ORCB/HWRB data indicate that the most frequent types of KCSs affecting private wells or nearby groundwater include LUST sites (43%), HAZWASTE (28%) and OPUF sites (10%).

Figure 2  
KCSs Project Types Impacting Water Supply (non-public)



N= 133 / 216, Source ORCB/HWRB Contaminated Sites Database;

<sup>7</sup> Weston Solutions, Inc. (2006). Final Phase I Report: Statewide Methyl Tertiary Butyl Ether Risk Analysis for the State of New Hampshire.

The remaining 84 KCS projects fall into the Ether and H<sub>2</sub>O Sample project categories indicating, as with public water supplies, an MTBE detection at a site without an identified source of contamination.

## Conclusion

The most numerous categories of PCS (with the exception of UIC) use or store petroleum products, or generate hazardous waste. KCSs that are known to have a detectable impact (N=112) upon public water supplies are likely to be the reason for causing an MCL violation at those public water systems in about 3.6 % of those cases (4/112). Leaking UST sites, hazardous waste sites, small spills, and leaking residential tanks appear to be the leading KCS project types impacting both public and non-public water supply. However, a significant percentage of KCSs involve Ether (MTBE or H<sub>2</sub>O Sample) detections of unknown origin.

Attachments: (1) *General Categories and Total Count of Groundwater Hazards in N.H.*

- (2) *ORCB/HWCB KCS Project Risk Categories (Cat 1-8)*
- (3) *ORCB/HWCB KCS Project Types*
- (4) *Statewide Study Looks at Risk Factors for MtBE Contamination, Spring 2007, The Source*  
(See <http://des.nh.gov/dwspp/Source/spring07.pdf>)
- (5) *New MtBE Data Includes Some Surprises, Winter 2005, The Source*  
(See <http://des.nh.gov/dwspp/Source/winter05.pdf>)

Attachment 1  
General Categories and Total Count of  
Groundwater Hazards\* in NH

UST Facilities	4,033
RCRA Generators (hazardous waste) <sup>1</sup>	2,863
<i>Leaking Underground Storage Tank (LUST)</i> <sup>2</sup>	2,192
<i>Residential or Commercial Heating Oil Tanks (OPUF)</i>	1,651
<i>Underground Injection Control (UIC)</i>	1,558
Above Ground Storage Facility (ASTs) <sup>3</sup>	954
<i>Non-Petroleum Contamination (HAZARDOUS WASTE)</i>	821
<i>Oil Spill or Release (SPILL/RLS)</i>	544
Vehicle Service & Repair (VSR)	420
<i>Holding Tank (HOLDTANK)</i>	352
<i>Asbestos Contamination (ASBESTOS)</i>	294
General Service & Repair (GSR)	253
Waste & Scrap Processing Sites (WSPS)	244
Laboratory (LAB)	233
<i>Unsolicited Site Assessment (SITEEVAL)</i>	205
Cleaning Operation (CLN)	204
Manufacturing (MAN)	199
Earth Excavation Equipment (EEE)	177
<i>Ether Contamination (ETHER)</i>	176
<i>Subsurface Wastewater Disposal System Receiving &gt; 20,000 gallons/day (SEPTIC)</i>	158
Auto Salvage Yards <sup>4</sup>	150
<i>Groundwater Contamination Detect (H2O_SAMPLE)</i>	137
Other Hazards (multiple groups)	106
<i>Leaking Above Ground Storage Tank (LAST)</i>	95
No Specific Type (NT)	82
Above Ground Storage Tank (ASTs)	64
Machine shop (MW)	60
Underground Storage Tanks (UST)	50
<i>Superfund Site (CERCLA)</i>	43
<i>Unlined Wastewater Lagoon (UWW/LAG)</i>	41
Car Dealership (CARD)	38
Construction Site (CONS)	37
<i>Septage lagoon (SEPLAG)</i>	37
<i>Leaking Motor Oil Storage Tank (MOST)</i>	34
Lined Landfill (LAND/LN)	31
<i>Leaking Bulk Storage (FUEL)</i>	25
<i>Lined Wastewater Lagoon (LWW/LAG)</i>	22
<i>Spray Irrigation Project (SPRAYIRR)</i>	20
Municipal or Commercial Stump or Demo Dump (STUMP/DEMO)	18
Salt Piles (SALT)	16
Septic Systems (SEPTIC)	13
Solid Waste Transfer Station (TRANS)	13
Farm > 10 animals (ANIMAL)	10
Food Processing (FP)	7
<i>Sludge Lagoon (SLUG/LAG)</i>	7
Concrete & Asphalt Plant (CAT)	6
Cemetery (CEMETERY)	6
<i>Underground Waste Water Lagoons (UWW/LAG)</i>	4
<i>Old Open Dump Site (OLD DUMP)</i>	4
(Machine Shop) MS	2
Golf Course (GOLF)	1
Mining/Quarry (MQ)	1
Snow Dump (SN)	1

\*Known contamination sources (KCS) categories in *italics*; some hazard categories represent hazards across the entire state, while other categories represent hazards in source protection areas.

<sup>1</sup> DES OneStop database (includes all active small and full quantity generator facilities)

<sup>2</sup> Includes 786 active and all other inactive LUST sites according to DES UST Program

<sup>3</sup> DES Above Ground Storage Tank Program (active facilities)

<sup>4</sup> Includes only salvage yards processing > 12 vehicles / yr, DES Greenyards Program

## PROJECT RISK CATEGORIES

RISK CATEGORY	DESCRIPTION	DEFINITION
CAT-1	IMMEDIATE HUMAN HEALTH RISK	<ul style="list-style-type: none"> <li>-DRINKING WATER SUPPLY IMPACTED; OR</li> <li>-OCCUPIED STRUCTURE WITH INTERNAL VAPORS AT UNSAFE LEVEL</li> </ul>
CAT-2	POTENTIAL HUMAN HEALTH RISK	<ul style="list-style-type: none"> <li>-DRINKING WATER SUPPLY POTENTIALLY AT RISK (RESIDENTIAL WELL WITHIN 1000 FT. OR SITE WITHIN SOURCE WATER PROTECTION AREA); OR</li> <li>-CLASS A SURFACE WATER IMPACTED; OR</li> <li>-POTENTIAL FOR VAPOR MIGRATION TO OCCUPIED STRUCTURE</li> </ul>
CAT-3	FREE PRODUCT OR SOURCE HAZARD	<ul style="list-style-type: none"> <li>-FREE PRODUCT PRESENT; OR</li> <li>-HIGH LEVEL SOURCE (BURIED DRUMS, ETC.) PRESENT</li> </ul>
CAT-4	SURFACE WATER IMPACT	-IMPACTED CLASS B SURFACE WATER
CAT-5	NO ALTERNATE WATER AVAILABLE/ NO EXISTING WELLS IN AREA	<ul style="list-style-type: none"> <li>-GROUNDWATER CONTAMINATION AND NO ALTERNATE WATER SUPPLY IS AVAILABLE (GROUNDWATER IS NOT CURRENTLY USED FOR WATER SUPPLY)</li> </ul>
CAT-6	ALTERNATE WATER AVAILABLE/HIGH LEVEL GROUNDWATER CONTAMINATION	<ul style="list-style-type: none"> <li>-HIGH LEVEL GROUNDWATER CONTAMINATION (&lt; 1000 X AGQS) AND ALTERNATE WATER SUPPLY IS AVAILABLE</li> </ul>
CAT-7	ALTERNATE WATER AVAILABLE/LOW LEVEL GROUNDWATER CONTAMINATION	<ul style="list-style-type: none"> <li>-LOW LEVEL GROUNDWATER CONTAMINATION (&lt; 1000 X AGQS) AND ALTERNATE WATER SUPPLY IS AVAILABLE; OR</li> <li>-CONTAMINATED SOILS PRESENT; OR</li> <li>-LOW LEVEL SOURCE PRESENT</li> </ul>
CAT-8	NO GROUNDWATER IMPACT & NO SOURCE	<ul style="list-style-type: none"> <li>-GROUNDWATER OR SURFACE WATER CONTAMINATION DOES NOT EXCEED STANDARDS AND NO SOURCE IS PRESENT</li> </ul>
NDY	RISK CATEGORY NOT DEFINED YET	

## Appendix D Project Types

AST	REGISTERED AST FACILITY
CERCLA	SUPERFUND SITE
COMPLAINTS	COMPLAINTS OR REFERRALS
FUEL	BULK STORAGE FAC. CONTAINING FUEL OIL
GWRELDET	GW RELEASE DETECTION PERMIT
H2O SAMPLE	ISOLATED GROUNDWATER SAMPLE
HAZWASTE	HAZARDOUS WASTE PROJECT
HOLDTANK	NON-HAZ, NON-SAN HOLDING TANK REGIST.
LAND/LN	LINED LANDFILLS
LAND/PRP	PROPOSED LANDFILLS
LAND/UNLN	EXISTING LANDFILL OR LANDFILL CLOSURE
LAST	BULK STORAGE FAC. CONTAINING MOTOR FUEL
LUST	LEAKING UNDERGROUND STORAGE TANK PROJECT
LWW/LAG	LINED WASTEWATER LAGOONS
MOST	LEAKING MOTOR OIL STORAGE TANK
OLD DUMP	OLD OPEN DUMP SITES (NON-LANDFILL)
OPUF	ON-PREMISE USE FAC. CONTAINING FUEL OIL
RAPIDINF	RAPID INFILTRATION BASINS
SEPT/LAG	SEPTAGE LAGOONS
SEPTIC	SUBSURFACE WASTEWATER DISPOSAL SYSTEMS
SITEEVAL	UNSOLICITED SITE ASSESSMENT
SLUD/LAG	SLUDGE LAGOONS
SLUDGAP	SLUDGE APPLICATION PROJECTS
SPECIAL	SPECIAL PROJECTS
SPILL/RLS	OIL SPILLS OR RELEASES
SPRAYIRR	SPRAY IRRIGATION PROJECTS
STUMP/DEMO	MUNICIPAL OR COMMERCIAL STUMP OR DEMP DUMP
TRANS. STA	SOLID WASTE TRANSFER STATION
UIC	UNDERGROUND INJECTION CONTROL
UWW/LAG	UNLINED WASTEWATER LAGOONS